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NOTES ON NORTH AMERICAN HEPATICAE. II.

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In the first paper of this series, published in the BRYOLOGIST for March, 1910, attention is called to ten species of Hepaticae of more or less interest. In the present paper ten additional species are discussed, the most important being *Neesiella pilosa,* the relationships of which are still incompletely understood. The three species of *Lejeuneae* from Florida have already been reported upon in the writer's recent paper on the Hepaticae of the Bahama Islands.[1] It seems advisable, however, to mention them again because they represent distinct additions to the flora of the United States.

RICCIA CALIFORNICA Aust.

Collected in August, 1908, on earth, at Departure Bay, Vancouver Island, by J. Macoun (*No. 5*); also, at Spence's Bridge, British Columbia, in June, 1910, by A. Brinkman (*No. 240*). The species has not before been found beyond the boundaries of California. Its discovery in British Columbia shows that it may be expected to occur in Washington and Oregon. A complete description of the plant, with figures, is given in Howe's "Hepaticae and Anthocerotes of California."

NEESIELLA PILOSA (Hornem.) Schiffn. Hedwigia **47:** 314. 1908. *Marchantia pilosa* Hornem. Fl. Dan. **8:** 7. *pl. 1426.* 1810. *Duvalia pilosa* Lindb. Not. F. et Fl. Fenn. **9:** 280. 1868. *Grimaldia pilosa* Lindb. Musc. Scand. 1. 1879.

Collected in July, 1907, on Corbeaux Ridge, Bic, Rimouski County, Quebec, by J. F. Collins (*No. 4877a*). The first and only other American record for the species was made by C. Jensen from specimens found by N. Hartz at Scoresby Sound, Greenland.[2] Even in Europe it is very rare and is known from only a few localities in Norway, Sweden, Finland, and Spitzbergen. It has also been reported from Siberia. According to Stephani[3] and C. Müller *N. pilosa* cannot be specifically separated from *Grimaldia carnica* Massal., [4]an alpine plant known from about half a dozen stations in Austria and northern Italy. Schiffner maintains, however, that the two species are still too incompletely known to justify this extreme view and thinks that, provisionally at least, they ought to be kept apart.

Schiffner [5] and C. Müller [6] have described *Neesiella pilosa* so fully and so clearly that only its more striking features will be mentioned here. The thallus is green on the plane upper surface and reddish brown below, the pigmented portion sometimes extending to the upper surface and forming a narrow band along the margin. The bulk of the thallus is made up of loose photosynthetic tissue in which the large air-chambers are arranged in several layers separated from one another by plates of cells. The chambers are bounded above by a thin-walled epidermis through which the boundaries of the chambers are clearly visible. Sometimes the epidermal cells develop small trigones but they are more frequently thin-walled throughout. The postical scales, which are large and imbricated, are lunulate in outline. Except for their hyaline margins they are deeply pigmented with purplish red. Each scale bears one or two appendages, composed of somewhat larger cells than the scale itself and soon becoming bleached out and transparent. The appendages are lanceolate and usually entire, although in some cases one or more minute and irregular teeth are present. The stalk of the carpocephalum bears a cluster of lanceolate scales at the base and also at the apex, similar to the appendages just described but larger.

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[1] Bull. Torrey Club **38:** 205-222. *pl. 9, 10.* 1911.

[2] Medd. om Gronl. **15:** 369, 1898.

[3] Sp. Hepat. **1:** 91. 1898.

[4] Ann. dell'Ist. Bot. di Roma **2:** 66. *pl. 9, f. 7.* 1886.

[5] Morphologische und biologische Untersuchungen uber die Gattungen *Grimaldia* und *Neesiella.* Hedwigia **47:** 306-320. *pl. 8.* 1908.

[6] Rabenhorst's Kryptogamen-Flora **6:** 264. *f. 163.* 1907.

The spores in the Bic specimens, which are apparently not quite mature, measure about 55 μ in diameter and are yellowish brown. The spherical face presents the appearance of being coarsely tubers culate when seen in profile but is really covered over with low ridge-across which form a more or less regular reticulum with about seven meshes the diameter of the spore. Where the spherical face meets the three triangular faces the ridges form a narrow wavy border about 5 μ wide. The triangular faces are not very clearly defined and bear a few irregular ridges which do not form a network. Each face, however, usually bears a ridge parallel to the border, and the three ridges by their coalescence form a second border much less regular and definite than the first. The elaters are about 10 μ in diameter and are bluntly pointed at each end. Each one usually shows three brown spirals, which are quite distinct from one another.

3. NEESIELLA RUPESTRIS (Nees) Schiffn. in Engler & Prantl, Nat. Pflanzenfam **1**^{3}: 32. *f. 17, G-K* (after Bischoff). 1893. *Duvalia rupestris* Nees, Magaz. d. Berlin. Ges. Naturf. Fr. **8:** 271. *pl. 10.* 1817. *Grimaldia rupestris* Lindenb. Nova Acta Acad. Caes. Leop. Carol. **14** (suppl.): 108. 1829.

Collected in May, 1903, on soil in cavities of a limestone ledge, at Lemont, Illinois, by E. J. Hill. The distribution of this species in North America is still very incompletely known. Apparently the first record of its occurrence was made in 1866 by Peck,[1] who cited specimens collected by E. G. Pickett at Havana, Schuyler County,

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[1] 19th Ann. Rept. Reg. Univ. State of N. Y. 65. 1866.

New York. The following stations may also be quoted from the literature: Mt. Albert, Gaspé County, Quebec (J. A. Allen); Belleville and Ottawa, Ontaria (J. Macoun); Springfield, Ohio (Spence). In Europe it is known from various localities in Germany, Austria, Switzerland, and Italy, and it has also been reported from Japan. It seems to be largely if not wholly confined to calcareous regions.

The close relationship between *N. rupestris* and the preceding species has recently been emphasized by Schiffner. Both gametophyte and sporophyte, however, yield a few differential characters of importance. The thallus of *N. rupestris*, for example, is even looser in texture than that of *N. pilosa* and the delicate epidermis tends to break down completely and to leave the air-chambers exposed, very much as in *Ricciella crystallina.* The postical scales, moreover, are small and inconspicuous, and the lanceolate scales on the stalk of the carpocephalum are very sparingly developed. The spores are very much like those of *N. pilosa* and average about 60 μ in diameter when well developed. The reticulations on the spherical face, however, are usually less distinct and fewer, measuring perhaps five across the face of the spore; on the triangular faces there are sometimes two ridges between the border and the apex of the spore, instead of one as in *N. pilosa,* but these ridges are often very indistinct and irregular. The elaters measure about 9 μ in diameter, and the two or three spirals are more or less united to one another, an important peculiarity first noted by Schiffner.[1]

The genus *Neesiella* is so closely allied to *Grimaldia* that many students do not consider them distinct and include the species of *Neesiella* under *Grimaldia.* Schiffner has shown, in fact, that the differential characters drawn from the carpocephala do not deserve the emphasis which has been placed upon them and that the only sharp distinctions between the genera are those derived from the vegetative structure of the thallus. At the same time he considers these differences sufficient to keep the genera apart. In *Neesiella,* as he points out, the basal tissue of the thallus is thin and the much more abundant photosynthetic tissue is exceedingly loose in texture, as already noted under *N. pilosa.* This condition is due to the fact that the air-chambers increase in size as the thallus matures without becoming subdivided to any great extent by secondary cell-layers which grow out from those originally laid down. In *Grimaldia,* on the other hand, the basal tissue of the thallus is thicker and the relatively less abundant photosynthetic tissue is much denser, the air spaces being very small, a condition produced by the abundant development of secondary cell-layers within the original chambers. On account of these differences in development each superficial chamber in *Neesiella* is provided with a pore even at maturity, and the boundaries of the chambers remain distinct. In *Grimaldia,* however, many of the superficial air-spaces have no pores in the mature thallus and the boundaries of the spaces are indefinite.

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[1] Oesterr. Bot. Zeitschr. **56:** 24. 1906.

4. METZGERIA DICHOTOMA (Swartz) Nees.

The remarkable gemmae of this species, characterized by the regular presence of two apical cells, were recently described and figured by the writer from Porto Rican specimens collected by E. G. Britton and D. W. Marble on Mt. Morales, near Utuado (*No. 498*).[1] The determination of these specimens was considered at the time a little doubtful because no gemmiparous material from Jamaica, the type locality of *M. dichotoma,* had been available for comparison. During the past summer, however, through the kindness of Mr. A. Gepp, the writer was allowed to examine a number of Hepaticae in the herbarium of the British Museum at South Kensington, and among these was a gemmiparous specimen of the species in question collected in Jamaica by Wilson (*No. 817*). Since the gemmae on this specimen agree closely with those on the Porto Rican material the determination of the latter as *M. dichotoma* may now be considered as definitely established.

5. METZGERIA FRUTICULOSA (Dicks.) Evans, Ann. Bot. **24**: 296. *f. 16.* 1910.

In the writer's recent account of this interesting species only one American locality could be quoted, namely: near Aberdeen, Washington, A. S. Foster (*No. 944*). In the herbarium of the British Museum a second American specimen is preserved, collected by W. Lobb in Oregon, no more definite description of the station being given. In all probability the species has a wide distribution in the United States and Canada.

6. SCAPANIA SPITZBERGENSIS (Lindb.) C. Müll. Frib. Bull. Herb. Boissier II. **1**: 607. 1901. Nova Acta Acad. Caes. Leop. Carol. **83**: 177. *pl. 24.* 1905. *Martinellia spitzbergensis* Lindb. Kongl. Sv. Vet. Akad. Handl. **23**⑤: 31. 1889.

Collected in 1896, on the Nugsuak Peninsula, Greenland, by the Cornell Party with the Peary Expedition. An arctic species, new to North America. Known also from Spitzbergen, the type locality, and from Siberia. The determination of the Greenland specimens has been confirmed by Müller. *S. spitzbergensis* bears a superficial resemblance to large forms of *S. nemorosa* (L.) Dumort., with which it was at first confused. Its leaves, however, differ in having strongly convex and reniform dorsal lobes and arched keels, each bearing a broad, spinose-dentate wing. In *S. nemorosa,* the dorsal lobes are plane or slightly convex and broadly ovate in outline, while the keel is usually straight or nearly so and bears a narrow wing with few or no teeth. The cuticle in the Greenland plants is strikingly verruculose.

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[1] Ann. Bot. **24**: 288. *f. 13.* 1910.

7. **Lopholejeunea atroviridis** (Spruce) comb. nov. *Lejeunea* (*Acrolejeunea*) *atroviridis* Spruce, Jour. Linn. Soc. Bot. **30:** 335. *pl. 20, f. 5-10.* 1894.

In a recent discussion of the West Indian species of *Ptychocoleus* (*Acrolejeunea*)[1] the writer calls attention to the fact that certain characters of the present species are aberrant to that genus and that its systematic position is perhaps elsewhere. A study of the type material in the British Museum shows that this view is correct and that the plant is really a member of the genus *Lopholejeunea,* as above noted. It should be mentioned, however, that Spruce himself at first referred the species to *Lopholejeunea,* transferring it to *Acrolejeunea* in his published paper. The perianth in *L. atroviridis* is four-keeled and the keels bear narrow denticulate wings. The perichaetial bracts are likewise sparingly toothed. In general habit the plant resembles *L. Muelleriana* but the lobules are more like those of *L. Sagraeana.* The species grows on rocks, and the type locality is Richmond Valley, St. Vincent, where Elliott found it in February, 1892 (*No. 219*). He afterwards collected it at two stations on Dominica, Picard Valley (*No. 442*) and Castle Brace River (*No. 1661*). Specimens from both these stations also, determined by Stephani, are preserved in the British Museum. No other localities for the plant have been reported.

8. CERATOLEJEUNEA INTEGRIFOLIA Evans, Bull. Torrey Club **38:** 213. *pl. 9, f. 13-19.* 1911.

Collected several times by S. Rapp, near Sanford, Florida, the earliest date being April 12, 1903. Known also from three stations on the island of New Providence. Perianths not yet discovered.

9. BRACHIOLEJEUNEA BAHAMENSIS Evans, Bull. Torrey Club **35:** 383. *pl. 28, f. 1-14.* 1908.

Collected in November, 1901, on Old Rhodes Key, Florida, by J. K. Small and G. V. Nash, (*No. 464,* in part). The species is also known from various islands in the Bahamian Archipelago and from Cuba.

10. CAUDALEJEUNEA LEHMANNIANA (Gottsche) Evans, Bull. Torrey Club **34:** 554. *pl. 33, f. 1-12.* 1908.

Collected in October, 1906, in a hammock near Long Prairie, Florida, by J. K. Small and J. J. Carter (*No. 2812*). Widely distributed in tropical America.

Specimens of the three *Lejeuneae* just noted are preserved in the herbarium of the New York Botanical Garden. They increase the number of *Lejeuneae* known from Florida to twenty-seven.

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[1] Bull. Torrey Club **35**: 165. 1908.